The Impact of Motivating Knowledge-Based Employees in Shanghai it Industry on their Individual Innovation Performance

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Abstract

Under the situation that IT industry has become an important force in Shanghai market, the incentive effect of knowledge-based employees in IT industry in Shanghai is not ideal. According to the needs of knowledge-based employees' motivation level expansion and knowledge-based employees' performance level improvement, as well as the reality and theoretical background of knowledge-based employees in Shanghai IT industry, five major research questions are proposed. This paper discusses the main motivational factors that motivate knowledge-based employees in the IT industry to improve their innovation, and how each of these main motivational factors affects the performance of knowledge-based employees in innovation. Taking demographic variables as moderator variables, a theoretical model of performance incentive for knowledge-based employees in Shanghai IT industry is established. After the design and development of the scale, data collection and analysis, the variable measurement research is conducted, and the variables hypothesized in the research are verified. Finally, the findings are discussed and explained. Therefore, this paper has completely completed the empirical research on the impact of motivating knowledge-based workers in Shanghai's IT industry on their personal innovation performance, realized that the theory guides practice, and put forward suggestions for the research conclusions and prospects for future research directions.

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Introduction

At present, the enterprises of IT industry in Shanghai are the focus and new strength in the market. The enterprises of IT industry studied in this paper are all scientific and technological enterprises. As a professional organization, knowledge-based employees are important members of enterprises, different from ordinary operators and transactional staff, and cannot be motivated by simple incentive methods. Ma and Bi (2019); Yao, (2018) put forward: "At present, some technology companies have a relatively simple way of motivating knowledge-based employees. Enterprises often only give employees cash, gift cards, daily necessities and other material incentives, ignoring the self-esteem, emotion, social status and other spiritual incentive needs of knowledge-based employees, resulting in the incentive effect leading to the co-growth of knowledge-based employees and enterprises is not significant. In addition, there are some problems in the IT industry's measurement of knowledge-based employee motivation, and it is not easy to objectively and effectively motivate knowledge-based employees." Li (2017) proposed through investigation and analysis that "IT enterprises generally adopt the combination of material and non-material incentives for knowledge workers. The rate of relatively effective incentive mechanism reaches 21%, and the rate of barely effective incentive mechanism reaches 45%. There is still a lot of room for improvement." Although the IT enterprises in Shanghai attach great importance to scientific research, they mainly use material and institutional incentives to motivate talents, but the actual incentive effect is not ideal. The specific incentive policies of some technology enterprises fail to guide the knowledge-based employees to achieve the goals of the enterprise, and cannot meet the needs of the knowledge-based employees. Cao & Li (2019) put forward that: "Technology enterprises need to make use of scientific and technological innovation to maintain their leading position in the industry, and establish a good system to retain talents and motivate knowledge workers to exert their creativity. The importance of a perfect incentive system is obvious. Freibichler et al. (2017) put forward:" To enhance the productivity of knowledge workers requires the application of behavioral science. Managers can utilize more resources and adopt various incentive methods to optimize the thinking and behavior of employees, to continuously help knowledge workers improve their performance and efficiency. Knowledge workers are the basic unit of performance generation. This study hopes to deeply study the influence and effect of incentive on performance, to formulate incentive methods suitable for the characteristics and effective execution of knowledge workers, thus improving the overall organizational performance of Shanghai IT industry technology enterprises.

Research Background

Guthrie (2021) suggests that "the newest knowledge work environment may face high frequency interruptions in independent work and the necessary interaction of certain workloads, and it urgently needs to perfectly reflect the situation where knowledge workers integrate the various "competitions and activities" they face in order to achieve their work goals scientifically and effectively. According to the complexity theory, the workplace can be understood as a complex adaptive system. Using case study design and detailed investigation for knowledge-based employees, it is found that relying on stability has been an important factor hindering the development of knowledge-based employees." Kelvin and Julian (2000) put forward that "in order to effectively develop knowledge workers and improve their work enthusiasm, necessary incentive means have become one of the important affairs of enterprise management. Enterprises adopt organizational culture, job design and other methods to encourage knowledge-based employees to enhance their sense of responsibility and work ability, and use reasonable encouragement, reward and promotion to urge knowledge-based employees to focus on the organic unity of individual and enterprise,

thereby improving work efficiency to the greatest extent and creating good value for enterprises." In terms of the performance of enterprise human resource management, scholars (Neal and David, 1998) believe that "performance is equivalent to the result of the completion of work tasks, which reflects the value generated by the activities and results of the work process." In the historical view of the results of innovation performance, Hagedoorn and Cloodt (2003) believe that: "Performance mainly refers to the results of the work, and it does not pay attention to who performs the functions. Employee outcomes are related to the organization's strategic goals, customer satisfaction, and funding. Innovation performance is usually measured by R & D investment, total innovation expenditure, number of new products, etc. "Li and Yu (2014) proposed that "to improve the performance of knowledge-based employees in technology enterprises, it is necessary to continuously improve the level of psychological capital of knowledge-based employees, adjust mutual expectations through timely communication between managers and employees, and prompt employees to continuously maintain a good work attitude, thus guaranteeing that knowledge-based employees continuously improve their work performance. " Zhou and Qi (2020) proposed that "the sense of fairness in performance evaluation of knowledge-based employees in technology enterprises has a positive positive effect on employees' job performance, and the more knowledge-based employees identify with the organization the more they can achieve high performance."

Combined with the views of the above scholars, this paper makes use of various existing studies to scientifically sort out the relevant theories of incentives and performance of knowledge workers, hoping to provide certain reference significance for human resources research. As a professional and competitive organization, the IT enterprise's performance incentive research on knowledge-based employees is inseparable from the characteristics of knowledge-based employees themselves. The group characteristics of knowledge-based employees in science and technology enterprises have clear characteristics. These knowledge-based employees have strong self-awareness and self-realization needs. Knowledge-based employees are an important force to bear the development of science and technology enterprises. Based on this premise, this paper studies the performance incentive of knowledge workers in science and technology enterprises combined with the background of The Times. Cui (2017) pointed out that "enterprises in the IT industry lack scientific and reasonable compensation incentives for knowledge workers, and employees' compensation is not equal to their actual effort, which leads to knowledge workers' dissatisfaction with compensation and affects their work enthusiasm. Many science and technology enterprises lack a good working environment, and the management system of enterprises limits the exertion of the innovative ability of knowledge-based employees." Ali Butt et al. (2019) proposed after empirical analysis that " Knowledge worker productivity in IT industry plays a mediating effect on work innovation and personal knowledge management can be effective in promoting innovation and knowledge worker productivity in knowledge-based technology business organizations. Today's managers need to find the right tools to manage knowledge workers and measure their individual performance individually." Chen (2019) pointed out that "a sound psychological contract can be used to improve the loyalty of knowledge workers, find out the consensus point between employee personality and team commonality, thus improving enterprise management ability and enterprise performance." At present, the academic research on the incentive and performance of knowledge-based employees in science and technology enterprises is not systematic and perfect. In the aspect of incentive, the research is messy, and the research is carried out from the angles of system, environment and material incentive of science and technology enterprise management, which lacks the effectiveness suitable for knowledge-based employees' incentive. In the aspect of

performance, there are some studies from the perspective of enterprises, but the studies based on the perspective of knowledge-based employees are less. For example, there are many discursive studies on task performance and contextual performance, but few empirical studies. In the research of innovation performance management methods and paths, there are many theoretical reasoning, while the reasoning based on empirical analysis is few or relatively simple.

Research question
Based on the above research background analysis and problem statement, this study puts forward the main problems that affect the motivation and performance appraisal of knowledge-based employees in Shanghai IT industry. In order to solve the key problems, the author believes that there are five basic problems to be solved:
1.What is the main motivating factor for IT industry to motivate knowledge-based employees to improve their innovation?
Specifically, the research objective specified as the following:
To explore the main motivating factors of Shanghai IT industry to motivate knowledge-based employees to improve their innovation.

Literature Review
Knowledge-based employee performance in the IT industry
The knowledge-based employees in Shanghai IT industry studied in this paper are all working in science and technology enterprises. The industries with the largest number of main posts in Shanghai IT industry include IT technology service, game, artificial intelligence service, software service, content consulting and other industries. The number of knowledge-based employees in these industries is quite large. The average annual salary of Shanghai IT industry ranks first in both urban private companies and non-private companies. The performance appraisal of individual knowledge-based employees in Shanghai IT industry generally includes innovation indicators. Hou (2019) pointed out that: "Shanghai vigorously supports cloud computing, Internet of things, artificial intelligence and other information industries, to build Shanghai advanced information manufacturing highland. As the competition in Shanghai's information software industry continues to intensify, there is a need to cluster a number of technology-based enterprises with continuous innovation capability and industry leadership in the software industrialization base, use special funds for innovation to foster the innovation capability of a number of technology enterprises, and continuously improve the innovation performance of the employees of technology enterprises." Zhang (2019) believes that "In the IT industry of Shanghai, enterprises with 300 or more employees and operating revenue of more than 100 million yuan or more are large enterprises; enterprises with more than 100 employees and operating revenue of more than 10 million yuan are medium-sized enterprises; enterprises with 10 or more employees and operating income of more than 500,000 yuan are small enterprises; enterprises with less than 10 employees and operating income of less than 500,000 yuan are micro enterprises. The performance of these Shanghai IT knowledge-based employees is closely related to the company's technology. Lin (2019) believes: "Technology companies have certain technological and innovative capabilities, and hope that the technology of knowledge-based employees will be productized and the market share will be continuously expanded. However, whether start-up technology companies can continue to develop healthily has various uncertain factors and high risks. Innovation is one of the important performance contents of knowledge-based employees in start-up technology companies." Regarding the theory of performance, scholar Brumbrach (1988) put forward that "performance is behavior and result. The behavior is displayed by the employee doing the job, and the task is implemented at a specific level.

Behavior is not only a tool of the result, but also can be considered as a result. It is the result of mental and physical effort to achieve the task, and can be studied and judged in isolation from the result. Sandberg (2000) believed that "performance is based on the ability of employees. Employees need to be competent." Ba (2008) believes that "Productive performance is an assessment method that reflects performance requirements in the form of responsibilities, objectives, indicator details, work tasks, key results, etc." Cao (2009) believes that: "Performance is to ensure accurate progress towards existing goals and to do the right thing accurately." Zhang (2019) believes that: "The positioning of performance belongs to the fulfillment of the goals set by the organization. Employees follow the relevant regulations and requirements of the organization and give full play to their own working ability and knowledge to carry out various actions. Of course, not all actions are matters within the scope of the staff's job responsibilities." Hu (2019) proposed that "individual performance results are affected by various factors. Specifically, it includes the level of staff, the influence of staff incentive on performance, the internal and external environment of the enterprise and the drive of incidental events on performance." Zhang (2020) believes that: "Employee work performance is the total number of all behaviors and results carried out by employees in daily work to achieve the goals of the organization. From the detailed consideration, the employee's job performance can be regarded as the activities carried out by the employees at work, but also the specific circumstances of the employees to achieve the tasks assigned by the organization." There are few researches on the performance of knowledge-based employees in IT industry. Yan (2015) puts forward that "according to the differences of evaluation objects, the industry divides performance into three parts: 'individual, department and organization', among which individual performance is the precondition for 'department and organization' performance." Dai (2018) put forward that "Some small and medium-sized start-up technology enterprises directly find a company's performance plan from the Internet to make a slight revision, and compile assessment indicators without communicating with knowledge-based workers. Although some questionnaires were made later to adjust the indicators, the performance appraisal scheme was not reasonable. Finally, the mismatch of knowledge-based employees' assessment results in the loss of personnel and the loss of enterprises. In order to scientifically compile the performance indicators of knowledge-based employees in science and technology enterprises, it is considered that the performance of knowledge-based employees should be reflected in terms of work quality, work effectiveness and work ability." This study considers that the performance of knowledge-based employees in Shanghai IT industry reflects a kind of individual performance, which is based on the whole enterprise strategy and the collection of individual tasks to achieve the enterprise goals and requirements. As a technology enterprise, innovation is an important aspect of personal performance.

Performance dimensions of knowledge-based employee in IT industry
Performance dimensions can present the components of all aspects of performance, but also can fully display the content of the concept of performance. At present, performance is mainly divided into one-dimensional, two-dimensional and three-dimensional views in the industry. First, the one-dimensional view. Scholars (Kane, 1996, Welbourme et al. 1998, Gilley et al. 2004) defined performance as an outcome, and Murphy et al. (1989) and others defined performance as behavior, both of which defined performance as a single dimension. Second, the two-dimensional view. Borman (1993) proposed two dimensions of performance, "task and contextual": "task performance focuses on the relevant behaviors associated with the priority tasks in the job, contextual performance focuses on the performance behaviors that employees achieve spontaneously for the organization or without assigned tasks, and contextual performance places more emphasis on the assessment of the employee's work

behavior." The suitability of performance-oriented "task-contextual" performance allocation has been confirmed by Scotter and Motowidlo (1996) and Chinese scholars Wang Hui et al. (2003). Rotundo, Sackett (2002) divided work performance into two dimensions: "task and non-task" from different perspectives, while non-task performance was subdivided into "productive non-task and counterproductive task" performance. This performance model is different from the performance classification of tasks and contextual, and it includes the performance behaviors that are unfavorable to the organization. Effective analysis and research on the main motivating factors and methods of knowledge workers, as shown in Table 1 below.

Table 1- Summary of Main Motivating Factors

Sort by	Scholars	Focused Research	Motivating Factors
1	Zhang & Peng (2001)	After years of investigation and empirical research, the motivational factors of Chinese knowledge-based workers are found	Compensation incentive, individual growth and development, challenging work and prospects, security and stability of work
2	Chen (2004); Xu (2011)	By analyzing the characteristics and motivating factors of knowledge-based employees, to propose the idea of effective motivation of knowledge-based employees	Individual development, challenging work, self-management empowerment mechanisms, total compensation
3	Huang & Wang (2009); Shi & Yang (2013)	Based on the characteristics, needs and behavioral dynamics of knowledge-based employees, to propose a motivational model for knowledge-based employees	Compensation incentives, job and achievement incentives, training incentives, career development incentives, organizational culture incentives
4	Luo & Deng (2012); Jiang & Jiang (2014)	Design a motivational model for knowledge-based employees based on expectation theory and combining various motivation theories	Compensation level incentive, opportunity level incentive, achievement level incentive
5	Gu (2013); Shi & Han (2014)	Propose incentive mechanism based on the characteristics of knowledge-based employees	Group environment motivation, promotion mechanism motivation, autonomy motivation, challenging work, fair and reasonable compensation system, trustworthy leadership
6	Wei (2015)	Study the problems in motivating knowledge-based employees and propose motivational measures	Material, spiritual incentives, incentive compensation system, scientific performance management system, career planning
7	Wang (2016); Li (2017)	Study the connotation and characteristics of knowledge-based employees and use demand orientation as the motivation base	Individual growth, diversified value distribution elements, flexible working and challenging work opportunities, positive and enlightened corporate culture, compensation and knowledge capitalization incentives, innovation incentives, training incentives, emotional incentives
8	Wu (2017)	Based on the analysis of the problems of incentive mechanism for knowledge-based employees in state-owned enterprises, to propose the incentive mechanism	Reasonable salary distribution system, good working environment, space and ability to enhance development, enhanced corporate values

		construction	

9	Peng, Liu & Jiang (2017); Yan (2020)	Analyze the effective motivation of knowledge-based employees and propose strategies to improve the motivation mechanism	Compensation incentive, personal development, career planning, training incentive, corporate culture, intellectual property incentive, performance incentive, promotion incentive, empowerment incentive
10	Liu (2018)	By analyzing the dilemma of knowledge-based employee motivation in Chinese high-tech enterprises, improvement measures are derived	strengthening of training intensity and system, scientific evaluation mechanism and system, flexible working system, independent and relaxed working environment
11	Wu (2018); Jiang (2019)	Problems of knowledge-based employee motivation, strategies of knowledge-based employee motivation	Training and learning, challenge motivation, work atmosphere motivation, self-actualization, compensation, career planning
12	Teng & Li (2019)	Analyze the current situation and problems of motivating the new generation of knowledge-based employees in high-tech enterprises, and motivate the new generation of knowledge-based employees	Work content incentive, compensation and benefits incentive, training incentive, corporate culture incentive
13	Wang (2019)	Analyze the problems of knowledge-based employee incentive model in high-tech enterprises and propose improvement measures	Proper material incentives, promotion and power and job status advancement incentives, attention and help for personal growth
14	Chen (2020)	Analyze the motivation problems of knowledge-based employees in small and medium high-tech enterprises and propose improvement measures	Performance assessment, perfect salary system, perfect welfare, clear career promotion channel
15	Pan & Zhang (2020)	Compare flexible incentive management with traditional incentive management, analyze the problems of traditional incentive management, and propose flexible incentive application and strategies	Performance Flexibility Motivation, System Flexibility Motivation, Emotional Motivation, Cultural Motivation, Career Planning Motivation
16	Li & Liu (2020)	For the knowledge-based employees of state-owned enterprises in the new era, construct incentive mechanism to give full play to the initiative of knowledge-based employees	Self-worth realization, compensation incentive, performance assessment incentive, harmony and unique corporate culture
17	Li & Li (2019)	Study the causes of knowledge-based employee compensation incentive problems based on mental accounting and propose solutions	Positive psychology training, material motivation, spiritual motivation, performance appraisal, diversified material motivation
18	He & Li (2020)	Analyze the current situation and problems of motivation of knowledge-based employees and study the motivation under two-factor theory	Good interpersonal atmosphere, clear promotion mechanism, rank-breaking salary system, work autonomy and self-motivation

Methodology
Research design
This study mainly uses questionnaires to obtain data so as to conduct data analysis and model validation, introduce theories related to motivation and performance, and design a questionnaire on motivation and performance of knowledge-based employees in such technology companies in the IT industry.The independent variables of this study include external incentives (compensation incentives, environmental incentives, promotion incentives), internal incentives (performance incentives, social motivations). The dependent variable is the individual's innovative performance. Moderator variables include Gender, marriage, age, educational background, income, and years of working.

Research object selection
This study takes the knowledge-based employees of IT industry in Shanghai as the research object, and analyzes the internal and external factors of motivation and its impact on performance.

Design of questionnaire
According to the scale development paradigm and principles proposed by churchi1, in the process of questionnaire development, this study first reviewed previous studies and variables, and then decomposed the identified concepts into several items to form a questionnaire for distribution and collection.The questionnaire is mainly divided into two parts: the first part is the basic demographic characteristics of the respondents, and the second part is the basic items of the variables involved in the model to measure the perception of individual. The question items all use seven-point scale, and respondents can choose 1 for Strongly disagree, 2 for Disagree, 3 for Somewhat disagree, 4 for Neither agree or disagree, 5 for Somewhat agree, 6 for Agree, and 7 for Strongly agree, with higher scores indicating higher levels of agreement and lower scores indicating lower levels of agreement. The questionnaire items are shown in Table 3-1.

Table 3-1 Questionnaire Items and Reference Sources

Variables	Title number	Items	Reference Sources
Compensation Incentives	A1	We always offer competitive compensation for knowledge-based employees	Barry Gerhart (2017). Basu, S., & Kiernan, M (2016). Ruan (2011)
	A2	We always distribute compensation appropriately according to the contribution of knowledge-based employees	
	A3	We always offer the right compensation according to the level of competency of our knowledge-based employees	
	A4	We always increase salaries (bonuses, wages) for knowledge-based employees in a timely manner	
Environmental Incentives	A5	We always have colleagues who encourage knowledge-based employees to keep moving forward	Tânia Ferraro et al (2018). Ruan (2011)
	A6	We always let knowledge-based employees get the right equipment for the job	
	A7	We always give knowledge-based employees the opportunity to do what they are good at	
Promotional Incentives	A8	We always use promotion incentives to improve the motivation of knowledge-based employees	Krista B. Lewellyn, Maureen I. Muller-Kahle (2012). Ruan (2011). Takahashi & Kiyoshi (2006)
	A9	We always use promotion incentives as one of the means to build emotional ties between companies and knowledge-based employees	

	A10	We always improve the promotion system to achieve dynamic incentives, so that knowledge-based employees can better set their career goals	
Performance Incentives	A11	We always try to meet the expectations of knowledge-based employees who are eager to achieve quality work results	Zhao & Zhuang (2019). Ruan (2011)
	A12	We always support our knowledge-based employees to expect their work to be more meaningful and contribute to the company	
	A13	We always support knowledge-based employees to gain recognition from others, the organization and society through their achievements	
Social Motivation	A14	We always pay attention to the interpersonal relationship of knowledge-based employees to ensure that they continue to work with a good attitude	Ruan (2011)
	A15	We build positive informal organizations and motivate knowledge-based employees through socialization	
Innovation Performance	B1	Knowledge-based employees in our companies are able to fully assess the feasibility of turning innovative ideas into practice	Cui & Yu (2019). Pamela Tierney & Steven M. Farmer (2004)
	B2	Knowledge-based employees in our companies often think about and solve problems and issues in their work from a new perspective	
	B3	Knowledge-based employees in our companies will explain their new ideas to their leaders and colleagues to get everyone's support	
	B4	Knowledge-based employees in our companies are able to offer their own ideas spontaneously in order to realize the innovative ideas of team members	

Sample Selection and Questionnaire Data Collection

Online: The questionnaire was edited using Questionnaire Star and distributed through QQ and WeChat; Offline: The questionnaires were mainly distributed in the office buildings of various IT companies in Shanghai and in the streets nearby by random sampling. A total of 555 questionnaires were distributed online and offline, including 135 offline questionnaires and 420 online questionnaires, with a total of 519 questionnaires recovered. After the questionnaires were collected, the invalid questionnaires were eliminated, and the questionnaires with messy answers, missing answers and inconsistent answers were removed, and finally 500 valid questionnaires were obtained, and the effective completion rate of questionnaires = 500/555 = 90.09%.

Data analysis methods

SPSS 22.0 statistical software and EXCEL 2016 are used for statistical analysis in this study. The data analysis methods are described as follows:
(1) Descriptive statistical analysis of the sample: Statistical description of the basic personal information of the respondents, including demographic characteristics.
(2) Reliability and validity test: reliability analysis is used to test the reliability and internal consistency of the questionnaire. The higher the Cronbach's alpha coefficient, the higher the reliability of the questionnaire. Validity analysis is used to test the validity of the questionnaire. The higher the KMO value, the more suitable it was for factor analysis, so that the measurement items could accurately reflect the measurement variables.

Reliability and validity test
Reliability test
Reliability is the degree of reliability, which refers to the same degree of results obtained by multiple measurements of the same research object using the same method. In statistics, reliability is used to measure the deviation in the statistical process and quantify the reliability of the extracted data. Therefore, it is necessary to judge whether the data are stable according to the results by repeatedly measuring the fixed research objects with the same method. Reliability is divided into external reliability and internal reliability. External reliability refers to the stability of the results of data testing at different times, and repeated measurement is often used. The latter refers to maintaining the inherent relationship between the scale items in the research process and maintaining its stability. Given that this study uses SPSS to measure reliability and the study data are all observations of different subjects at the same time, an internal test is used. Reliability measurement index is mainly Cronbach' s alpha coefficient, the acceptability of the questionnaire increases with the increase of the reliability coefficient. Generally, a reliability coefficient higher than 0.7 indicates a high reliability of the questionnaire. If it is lower than 0.7, it means that the questionnaire needs to be revised.
Criteria of Cronbach's alpha are listed below:

Table 3-2 Criteria of Cronbach's alpha

Cronbach's alpha value	Standard
Cronbach's $\alpha <= 0.3$	unreliable
$0.3 <$ Cronbach's $\alpha <= 0.4$	barely reliable
$0.4 <$ Cronbach's $\alpha <= 0.5$	Slightly more reliable
$0.5 <$ Cronbach's $\alpha <= 0.6$	Reliable
$0.7 <$ Cronbach's $\alpha <= 0.9$	Very reliable
$0.9 <$ Cronbach's α	Extremely reliable

This study uses SPSS 22.0 statistical software for reliability test, the analysis data showed that the Cronbach's α coefficient of the overall sample is 0.821, which was very credible. The alpha coefficients of other variables are all greater than 0.7, meeting the study requirements.

Findings and Discussion
Descriptive analysis of respondents
The gender ratio of respondents is relatively similar among the 500 valid samples of this questionnaire. There are 266 males, accounting for 53.2%; 234 females, accounting for 46.8%. The age distribution is as follows: 19-26 year-olds account for 24.4%, followed by 27-35-year-olds with 61%. It can be seen that young people and the 35-year-old group account for the majority of the IT industry.

Marital status: unmarried people account for 24.2% and married people account for 60.8%, indicating that married people are the main workers in the IT industry.
Position: Senior managers account for 1.4% and ordinary employees account for 84%, indicating that grass-roots employees are the main members of the IT industry.
Educational background: the proportion of people with a doctor's degree is 0.8%, and the proportion of people with a master's degree is 7.4%, indicating that knowledge-based employees in the IT industry with a doctor's degree are still scarce.
Annual income: The percentage of people with 100-150 thousand is 8.4%, the percentage of people with 160-250 thousand is 59.2%, and the percentage of people with 260-500 thousand is 26.2%, indicating that the salary of the vast majority of IT industry knowledge-based workers is between 100,000 and 500,000 yuan.

Department: Administrative staff accounted for 1%, technical R&D staff accounted for 77.6%, and general staff accounted for 4.6%, indicating that R&D staff is the main member of knowledge-based employees in the IT industry.

Variation analysis of Individual Knowledge-based employees
In the variation analysis, it mainly studies whether gender, marriage, age, educational background, income and working years will form significant differences in innovation performance. Marriage differences adopt independent sample t test, and other factors differences adopt analysis of variance.

Gender variance
In the research hypothesis section, by sorting out relevant literature, this paper puts forward Hypothesis 1: There is a significant difference in the effect of gender on the innovation performance of knowledge-based employees in Shanghai's IT industry. In order to verify this hypothesis, the author used SPSS22.0 in combination with EXCEL 2016 to conduct variation analysis. The gender analysis of innovation performance uses Independent sample t test, as shown in Table 4 - 2, which shows the independent sample t-test statistical scale, listing the sample size, mean, standard deviation and standard error of the "male and female" groups respectively. Male sample size N = 266, female sample size N = 234, indicating that the gender ratio of knowledge-based employees in Shanghai IT industry is relatively small. The mean value of "men" is 81.62, which is higher than that of "women" (79.98), indicating that men's innovation performance is stronger than women.

Table 4-3 Gender Statistical Scale

Research variables	Gender	N	Mean value	Standard deviation	Standard error
Innovation Performance	Male	266	81.62	8.881	0.545
	Female	234	79.98	8.65	0.565

After judging the sample size, mean, standard deviation and standard error related to gender, the F value and P value of the output can be observed to determine whether gender has a significant impact on the innovation performance of knowledge-based workers in Shanghai IT industry. The test results can be found in the Gender Independent Sample t-test analysis table, as shown in Table 4-3. F value of Levene's test is 1.545, and the significance P value is 0.214> 0.05, so the variances are homogeneous. Independent sample t-test statistics between different groups, assuming equal variances t=2.087 and assuming unequal variances t=2.091, p-values are 0.037<0.05. Therefore, there are significant differences between gender on innovation performance.

The relationship between compensation incentive and innovation performance
In the research hypothesis section, by sorting out relevant literature, this paper puts forward Hypothesis 2: Compensation incentive is positively correlated with innovation performance of knowledge-based employees in Shanghai IT industry. In order to verify this hypothesis, the author used SPSS22.0 in combination with EXCEL2016 to perform correlation analysis. The descriptive statistics scale gives basic statistical information for the two variables, including mean value and standard deviation. The mean value of compensation incentive = 1216.9 refers to the amount of dollars needed to motivate 500 knowledge-based employees per person per month. The mean value of innovation performance = 84.768 refers to the average innovation performance score of the 500 knowledge-based employees per person per month. N=500 means 500 knowledge-based employees.

Table 4-4 Descriptive Statistical Scale of Compensation Incentive and Innovation Performance

	Mean value	Standard deviation	N
Compensation Incentives	1216.900	738.4979	500
Innovation Performance	84.768	7.5238	500

After judging the mean value and standard deviation, the Pearson value of the output can be observed to determine whether the impact of compensation incentive on innovation performance of knowledge-based employees in Shanghai IT industry is significant. The results are shown in Table 4-20.

Descriptive Output:

Table 4-5 Matrix of correlation coefficient table between compensation incentive and innovation Performance

		Compensation Incentives	Innovation Performance
Compensation Incentives	Pearson correlation coefficient	1	.635**
Significance (two-tailed)			.000
N		500	500
Innovative performance	Pearson correlation coefficient	.635**	1
Significance (two-tailed)		.000	
N		500	500

* *: Correlation is significant at the 0.01 level (two-tailed).

The correlation table gives the Pearson correlation coefficient and its test results. The Pearson correlation coefficient is 0.635, which is very significant with a significance level of 0.01 (two-sided test), indicating that there is a significant strong positive correlation between compensation incentives and innovation performance of knowledge-based employees in Shanghai IT industry. Hypothesis W1a is verified and proved to be valid. Most scholars in the industry believe that there is a positive relationship between compensation incentive and innovation performance, and very few believe that the relationship is not necessarily positive. Wang et al. (2015) proposed after empirical analysis that "the main means of corporate executives' motivation are compensation and equity. If these incentives are used properly, it can effectively motivate corporate executives. It ensures the effective flow and allocation of internal and external innovation resources, which directly affects the development of innovation activities of enterprises, and the higher the executive compensation, the higher the company's investment in technological innovation. The annual compensation of senior executives has a positive effect on the technological innovation of enterprise employees, and the compensation incentive of senior executives has a significant positive effect on innovation performance." Zhang (2018) proposed through empirical research: "There is a significant positive correlation between corporate performance and executive monetary compensation, and the incentive effect of executive monetary compensation plays a stronger role in state-owned holding enterprises, compensation incentive can effectively and positively affect individual executive innovation performance. Corporate performance is significantly and positively related to the shareholding of executives, and the incentive effect of executive shareholding plays a stronger role in state-owned enterprises; the incentive effect of compensation consisting of monetary compensation and equity returns is more significant than the incentive effect of monetary compensation in both state-owned or non-state-owned enterprises." Zhu Jiaming et al. (2019) proposed that "in the practice of corporate human resource management, compensation incentive is a basic incentive with health care function. In fact, whether it can effectively motivate employees, promote their work enthusiasm, and maximize work performance depends not only on the value of compensation itself, but also

on employees' perceived justice of their own compensation. That is to say, employees will use current compensation as a reference, compare it with their past compensation, their own contributions, and the compensation of others, and use this to judge whether the organization treats them fairly. Whether such employee's judgment is good or bad, it will affect the employee's subsequent job involvement. Therefore, the adoption of a fair compensation incentive model for employees can effectively affect individual innovation performance." Zhao and Li (2019) pointed out through empirical research that the management of an enterprise has an important impact on the growth of the enterprise and the decision-making of the organization and operation, and entrepreneurial orientation influences the performance of the enterprise through the incentive of senior executives. Entrepreneurial orientation has a significant positive effect on enterprise performance, executive monetary compensation incentive and equity compensation incentive have a significant positive effect on enterprise and executive innovation performance, and entrepreneurial orientation has a significantly negative moderating effect on executive compensation incentive and enterprise performance."

Conclusion

According to the classification of different knowledge-based employees, this paper studies the relationship between employee motivation and innovation performance. Based on the review of relevant literature, using 500 valid questionnaires as research samples, through factor analysis, correlation analysis, multiple regression and other empirical research, it is found that the incentive of knowledge-based workers in Shanghai IT industry has a good role in promoting their personal innovation performance. This study focuses on the analysis of individual knowledge-based workers, to explore the positive effects of internal and external incentives on individual innovation performance of knowledge workers in Shanghai IT industry. Based on the performance incentive model of Shanghai IT industry knowledge workers, it is proved that there is a significant positive correlation between the compensation incentive, environmental incentive, promotion incentive, performance incentive, social incentive and innovation performance of Shanghai IT industry knowledge-based employees through correlation analysis and multiple regression analysis. Through the variance analysis, it is found that the impact of gender, educational background, income and years of working will have significant differences on innovation performance of knowledge-based employees in Shanghai IT industry, while the impact of marriage status and age will not have significant differences on the innovation performance of knowledge-based workers in Shanghai IT industry. According to the performance incentive model of knowledge-based employees in Shanghai IT industry constructed above, and through questionnaire survey and empirical analysis of knowledge-based workers in Shanghai IT industry, this study puts forward the following research conclusions: The way of compensation incentive reflects the demand of knowledge-based workers for material life, and economic factors are the basis of knowledge-based employees' life and work. The role of compensation incentive is mainly reflected in the enthusiasm of knowledge-based workers for job innovation, which reflects that the innovation performance of knowledge-based workers in Shanghai IT industry can be stimulated to invest more time and energy in their work by improving salary and other ways. In the analysis of compensation incentives, it is found that there is a significant positive and strong correlation between compensation incentive and innovation performance, which proves that knowledge-based employees recognize the role of compensation incentive on innovation performance and will actively work to achieve it, and eventually the effect of compensation incentives is indeed more obvious. (Bao, 2018; Agung et al. 2021).

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